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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/594,868 | 09/28/2006 | Klaus Rose | 09997.0138USWO | 8198 |

23552 7590 03/07/2011

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| EXAMINER | |
|---|---|
| HORNING, JOEL G | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1712 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 03/07/2011 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/594,868 | ROSE ET AL. | |
| | Examiner | Art Unit | |
| | JOEL G. HORNING | 1712 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 December 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-7 and 9-20* is/are pending in the application.

4a) Of the above claim(s) *14-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 9-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Status of Claims*

*1.* In the response of December 23rd, 2010, applicant has argued the validity of the rejection. No claims have been amended, cancelled or added. Claims 1-7 and 9-20 are currently pending.

### *Election/Restrictions*

2. **Claims 14-20** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on June 22nd, 2009.

### *Claim Objections*

3. **Claim 2** is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 2 only adds an optional limitation ("may be added"), so it does not further limit the parent claim 1.
4. **Claim 11** is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim can only refer to its possible parent claims in the alternative. Claim 11 depends from claim 1 and claim 10, but does not refer to them in the alternative only. See MPEP § 608.01(n). Accordingly, the claim 11 has not been further treated on the merits. A simple way to fix this is to include the text of

the ingredient list from claim 10 in claim 11 instead of depending on claim 10 to supply those limitations.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. **Claims 1-7 and 9, 10, 12 and 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Haas (Surface and Coatings Technology **111** (1999) 72-79, as supplied by applicant) in view of Linden (WO 03/066933) in view of Goodwin (WO 03086031).

Haas is directed towards making inorganic-organic hybrid polymer material coatings (ORMOCER®s) via a vapor phase deposition process (Section 1: Introduction). It teaches making these films by a hybrid process where a liquid phase process first forms organic/inorganic cross-linked prepolymers by sol-gel

processing. Then the material is spray or vapor deposited onto a substrate where it is further disassociated and then crosslinked by using heat or light to create the desired degree of crosslinking and as a result the desired properties in the film (Section 2 and figure 2). However, Haas does not teach performing the disassociation and crosslinking by spraying the prepolymer though a plasma, instead spraying it and then curing it.

Linden is also directed towards making inorganic-organic hybrid polymer material coatings (ORMOCER®s) (page 4, lines 1-20). It teaches that such coatings are, like Haas, normally sprayed or vapor deposited onto a substrate where they are then cured. However, Linden further teaches that such processes require many processing steps, long curing periods, prolonged preserving steps and large amounts of solvents. Linden teaches that by plasma activated depositing the hybrid material, these problems can be avoided and an improved coating can be deposited (page 1, line 24 through page 2, line 19). In its improved process, Linden teaches that almost any organic substances can be used as the precursor (page 7, lines 8-12) including organosilicon previously polymerized compounds, which can supply both the inorganic and organic components of the deposited material (page 9, lines 1-14).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to modify the process of Haas by plasma depositing the prepolymer compound formed by a sol-gel method, in order to gain the reduced processing time, processing steps and reduced amounts of solvents used in the process.

Linden teaches that the source of the plasma is not particularly limited by type (e.g. DC, RF, microwave; page 7, lines 6-7), but it does not specifically teach using a dielectric barrier discharge plasma.

Goodwin et al is also directed towards a process for depositing coatings on substrates. An atomizer is used to introduce an aerosol of a precursor for a coating forming material into the plasma [0019]. A substrate to be treated is introduced between these electrodes while the atmosphere is being controlled to generate a plasma discharge [0051], the aerosol precursor material is introduced into the plasma discharge [0052], so that a coating is deposited on the substrate [0053]. Goodwin et al further teaches using different precursors depending upon the desired film, including precursors to make hybrid inorganic/organic pre-polymer) [0040, 0046]. However, the process is performed in a system where the plasma is generated by two electrodes with a dielectric plate between them (which is what a dielectric barrier discharge is) [0019]. Goodwin teaches that other plasma discharges are required to operate at low pressures, increasing costs and reducing throughput [0012], however, this process allows the plasma to be formed at atmospheric pressure [0019].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to specifically use a dielectric barrier discharge process as taught by Goodwin in the process of Haas in view of Linden, since it was known to be suitable for that plasma polymerization of hybrid organic/inorganic materials from similar precursors and in order to allow the process to be operated at atmospheric

pressure and thus increase the throughput and reduce the costs of the process **(claim 1)**.

6. Regarding **claims 2 and 10**, Goodwin et al teaches that mixtures of different precursors (e.g. gases and vapors) can be added together to the plasma discharge in order to further tailor the physical properties of the coating to meet particular needs [0040]. Additionally, inorganic colloidal metals can be added in order to improve conductivity or optical properties of the resulting film [0046].

   Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to supply different additional components (gases and vapors and inorganic colloidal metals) to the plasma discharge in order to further tailor the properties of the resulting film, as it known to the art **(claims 2 and 10)**.

7. Regarding **claim 3**, aerosols are mixtures of solids or liquids with gases. As shown in figure 3 of Goodwin, the aerosol creating spray nozzle **74** produces an expanding fan-like spray [0052], thus the volume fraction of liquid or solid in the aerosol will decrease as the distance from the nozzle increases (the fluid volume is being diluted by an increasing volume of the gas in the aerosol). This is a compositional gradient in the pre-polymer material in the aerosol. Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to have such a compositional gradient since it is a consequence of using the taught equipment.

8. Regarding **claim 4**, the Goodwin et al teaches that the dielectric barrier discharge process takes place at atmospheric pressure (abstract), which is within applicant's claimed range.

9. Regarding **claim 5**, Goodwin et al teaches that the dielectric barrier discharge uses a frequency of 29kHz [0061], which is within applicant's claimed range.

10. Regarding **claims 6**, Haas teaches that the substrate can be a plastic film (section 3.4.2).

11. Regarding **claim 7**, the coating is taught to modify the properties of the substrate, for example, Haas teaches modifying the gas diffusion barrier properties of the substrate film by depositing the hybrid organic/inorganic coating (section 3.4.1).

12. Regarding **claim 9**, Haas teaches forming the pre-polymer from tetraethoxysilane (fig 3, top left molecule).

13. Regarding **claim 10**, Goodwin et al further teaches that the pre-polymer mixture can also comprise colloidal metals [0046].

14. Regarding **claim 12**, Goodwin et al further teaches that the precursor in such a plasma deposition process may be applied as a liquid [0039].

15. Regarding **claim 13**, Haas does not teach using a moving material web for the substrate. However, Goodwin et al teaches that the substrate useful for depositing layers can be a moving web [0017, 0022, 0024, 0025].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the films of Haas onto a plastic moving web, since such substrates were known as desirable substrates for such dielectric barrier discharge processes, and would produce only predictable results **(claim 13)**.

16. **Claims 3** is additionally rejected under 35 U.S.C. 103(a) as being unpatentable over Haas (Surface and Coatings Technology **111** (1999) 72-79, as supplied by

applicant) in view of Linden (WO 03/066933) in view of Goodwin (WO 03086031) as applied to claim 1, further in view of Chow et al (US 20020031658).

Goodwin et al further teaches that the deposited (organic/inorganic) layers can be formed into multilayer coatings on its substrates [0044], but does not teach how the interfaces between those layers should be formed.

However, Chow et al is also directed towards the spray deposition of organic-inorganic hybrid materials [0013] through aerosols [0032]. It teaches that by varying the composition of the precursor feedstock supplied during spraying , a fine composition gradient can be formed in the coating (abstract), which increases the compatibility of hybrid multilayered materials [0027] and can enhance the thermal, chemical and mechanical stability of the multilayer coatings and enhance control of their properties [0033].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to supply a compositional gradient in the supplied aerosol precursor during deposition in order to form graded interfaces between the different layers in a multilayered coating in order to increase the layer compatibility, improve the stability of the resulting film and in order to better control the properties of said film **(claim 3)**.

***Response to Arguments***

17. Applicant's arguments filed have been fully considered but they are not persuasive.

Applicant's arguments, see applicant's remarks pages 7-10 and the included signed statement, filed December 23rd$^{th}$, 2010, with respect to the rejection(s) of the claims under Fraunhofer and Goodwin have been fully considered and applicant's

evidence that Fraunhofer is not available as prior art under 102(b) is convincing and applicant's argument that the prepolymer of Goodwin may not be cross-linked is considered persuasive. Therefore, the rejection on those grounds has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made.

***Conclusion***

18. No current claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571) 270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./
Examiner, Art Unit 1712

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1712